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A PLEA FOR MORE AMATEUR VARIABLE-STAR OBSERVERS.

By Edward Gray.

Of all the scores, perhaps literally hundreds, of telescopes in this country in the hands of amateurs, how many are producing results tangible and accessible to science? Is not a great waste of optical equipment going on? Is it not true that after a period of recreation among the double stars, the planets, and the Moon the telescope too often gets set aside for want of an aim by which it can be profitably used?

At this stage why are the variable stars so sadly neglected? Excepting the observation and discovery of comets is there any other line more directly open to amateurs in which the observer may do original work that shall count and in which his results may be made useful to the present and to future generations?

The object of this paper is to set forth how inviting and remunerative a field to amateurs the observation of long-period variables is. In the first place, one's equipment need not be very elaborate nor highly expensive. For a small minority of observations a good field-glass will suffice, but for the large majority a telescope of some aperture between two and six inches, or a reflector of four to eight inches in diameter, is desirable. As a matter of fact, two members of the Variable Star Association of our country use very small refractors—namely, one of two and a half and one of two inches,—and each does good work therewith. Nor is an equatorial mounting at all essential; probably the majority of us use a tripod mount. This means, of course, much more work at first in getting acquainted with the fields, but rapid work thereafter. I have, for example, a recent letter from a highly valued correspondent who uses a three-inch refractor on a tripod mount, giving a list of twenty-six estimates made that evening, the telescope being back in the house by 8:50. This is adduced merely to show what familiarity will accomplish.

The stars to be observed are variable in very different periods, from two months to well nigh two years. Some are therefore increasing, some decreasing, in brightness; a few are at maximum, others at minimum, and still others resting before either rising or falling. All this insures variety; there is nothing humdrum about observing variable stars. Surprises are frequent and one's interest is kept on the *qui vive;* for while some stars are perfectly regular and move like clockwork, others are irregular enough in their fluctuations to furnish all the mystery necessary. Some are white, some yellow, some orange, some red, and a star red at or close to minimum may become orange near maximum. It does not follow that because SS *Cygni* performed its cycle in nine weeks, three or four months ago, that it will do the same at the next period. In fact on the 15th of March I found it at maximum only forty days after the previous one—an observation unique in my acquaintance with this star.

Seldom does one devote himself for six or more months to this line of research without describing it as fascinating. And if the mere observing is charming and fascinating, what shall we say of the intellectual profit and expanse of the mind to be attained thereby? For, be it known that there are problems connected with these stars which may exercise even the best intellects. Why do some variables, like R *Hydræ,* shorten their periods and others, like χ *Cygni,* lengthen theirs? Why does *Mira Ceti* sometimes hardly exceed the fifth magnitude at maximum and at others reach almost the second? Why, again, does this same star descend only to the eighth magnitude at some minima, but at others to the ninth, or 9½, and why should it vary to the extent of twenty days in either direction from its mean period of 331⅓ days? What physical cause is there why U *Geminorum* and *SS Cygni* should remain close to minimum for weeks or months and then suddenly rise, attaining maximum in two days or less? Why do very red stars usually have very long periods? And so forth to more complex queries.

Besides the telescope—and some place to use it—there are needed only a good star atlas and a number of charts of the variables to be studied. The intending observer should associate himself with the American Association of Variable Star

Observers or with the Society for Practical Astronomy. The necessary charts are procurable from the members or directly from the Harvard College Observatory. Patience and perseverence do the rest.

It can only be ignorance of the pleasure and the usefulness, combined, of variable-star observing which has so far deterred amateur observers. One great obstacle has been the want of a primary volume on this branch. This is to be met within two years by Father HAGEN.

At present the literature is scattered in various magazines. The beginner's path is now, however, distinctly easier than it was three years ago. The magazine *Popular Astronomy* gives each month a report of the work of our association, the observations now numbering 700 to 1,100 per month, according to weather; but more observers are needed to carry on the work properly.[1]

Is it not practicable to establish a variable-star section in our own society? What is needed other than a director inspired with zeal for the cause?

A vast number of observations is needed for study and to accumulate the data required for elucidating the many problems related to variable stars. Who will volunteer to take hold and help and in the process become fascinated?

Let me now present the claims of variable stars in résumé:—

1. It is the chief line open to amateurs in which they may do good work and turn their telescope power to useful account. Many hundreds of thousands of such observations are required for the purpose of the professional astronomer and the field is open, with no crowding.

2. This pursuit has a charm which must be experienced to be appreciated. It does not pall nor grow monotonous.

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[1] To support this statement, let me quote from the *Annals* of the Harvard College Observatory, Vol. LV, p. 39, (italics mine):—

"062508 X *Monocerotis.*—A period of 163 days satisfies many of the measures made on Harvard photographs from March 24, 1888, to November 13, 1901; but there are large irregularities, and assuming this period. the variable was sometimes at or near minimum at computed dates of maximum. The form of the light-curve and range of variation are also very irregular. The spectrum of the star is that which is characteristic of long-period variables. *Very few visual observations have been published.* Since it does not appear to go below the tenth magnitude. *it could easily be followed with small telescopes, and continuous observations, when the star is not too near the Sun, are needed to learn the nature of the changes of this interesting variable.*"

3. It has an educative and intellectual value of its own. This can be better understood after a practical acquaintance with the pursuit.

4. It is not costly.

5. It leads to the formation of desirable acquaintances for a most cordial *esprit de corps* exists among its devotees.

6. It requires method in observing and recording results, and leads to habits of exactness; likewise to the setting of problems to be worked out and to a desire for higher knowledge. Its influence is wholly wholesome upon mind and brain and temper. It is an uplifting pursuit.

7. It is constructive, not destructive, and adds to the sum of human knowledge.

In view of this presentation, will not a few of you join the ranks of the observers? I should be glad to assist any novice in making a right start, remembering the difficulties which confronted me at the outside for want of accessible advice.

ELDRIDGE, CAL.

PLANETARY PHENOMENA FOR JULY AND AUGUST, 1913.

By MALCOLM MCNEILL.

PHASES OF THE MOON, PACIFIC TIME.

New Moon	July 3,	9^h 6^m P.M.	New Moon	Aug. 2,	4^h 58^m A.M.
First Quarter	" 10,	1 37 P.M.	First Quarter	" 8,	8 3 P.M.
Full Moon	" 17,	10 6 P.M.	Full Moon	" 16,	12 27 P.M.
Last Quarter	" 26,	1 59 A.M.	Last Quarter	" 24,	4 18 P.M.
			New Moon	" 31,	12 38 P.M.

The third eclipse of the year, a partial eclipse of the Sun, occurs on August 31st. The region of visibility is from Greenland to Nova Scotia. The eclipse is a small affair devoid of scientific interest, the maximum obscuration of the Sun being only 15 per cent of its diameter.

The Earth is in aphelion on the afternoon of July 3d.

Mercury is an evening star at the beginning of July, setting rather more than an hour and a half after sunset, and the interval does not diminish to an hour until after the middle of the